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EX PARTE OR LATE FILED

March 10, 1997

Mr. William F. Caton
Secretary
Federal Communications Commission
1919 M Street, NW Room 222
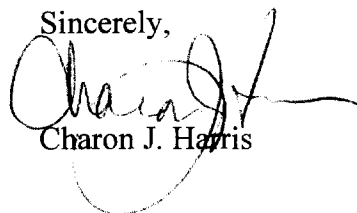Washington, D.C. 20554

EX PARTE: Federal-State Joint Board on Universal Service (CC Docket No. 96-45)

Dear Mr. Caton:

Yesterday, March 9, Professor Paul Milgrom of Stanford University sent the attached electronic message regarding the design of an auction for universal service support in the captioned docket to Elliot Maxwell, Greg Rosston, Evan Kwerel, Bill Sharkey, and Pat Degraba. In accordance with Section 1.1206(a)(1) of the Commission's Rules, an original and two copies of this notice are being filed with the Secretary of the FCC.

Please let me know if you have any questions.

Sincerely,

Charon J. Harris

Attachment
cc: P. Degraba
     E. Kwerel
     G. Rosston
     E. Maxwell
     W. Sharkey

Dear Colleagues:

+ This is a revised version of my e-memo of March 4 (sent 10:47am) taking into account the two extra items discussed in a phone conversation between the GTE and FCC teams on Friday. It wholly incorporates my earlier e-memo (with light editing to remove some typos), incorporates some new material, and adds Prof Dan Vincent to the list of recipients. The significant changes are marked for easy identification by the inclusion of a + (signifying "additions") either as the first character of the new paragraph or in the left-hand margin of a changed line. The revisions are primarily intended to add a discussion of facilities-based competition, to make some corresponding changes in other paragraphs, and to rationalize the competition objective in terms of the more fundamental consumer welfare objective.

This e-memo is an informal document intended to summarize and synthesize the discussions among some of us about universal service auctions or, more precisely, about how one might use auctions to set prices and determine the carriers to provide basic service to high cost areas. It does not necessarily reflect the views of my client, GTE. I hope that this memo can be used to help focus discussion at the upcoming forum on universal service.

The memo comprises four sections. Criteria and goals are the subject of section I, while section II contains a discussion of the kinds of environments in which the mechanism must work effectively. Some other decisions that interact with the auction design and affect the auction's outcome are discussed in section III. In view of all the foregoing, the specific proposals we have talked about are discussed in the last section.

I. GOALS AND SUCCESS CRITERIA

We have discussed a wide range of criteria for evaluating the success of any auction mechanism that establishes support for universal service. Some have expressed the belief that, absent a good auction proposal, the default will be that subsidies are set for each area based on cost models (that is, at the estimated cost of service minus the price paid by the subscriber) and that any eligible carrier ("el tel") will be free to receive subsidies by assuming a universal service obligation for the area.

and quality and the variety of the services offered to consumers in the high cost areas and elsewhere. As a practical matter, this concern is addressed by promoting the next objective: competition.

-Competition. Entry should be promoted in areas where competition "in the market" is economically efficient. There is a special interest in favoring and promoting facilities-based competition rather than competition merely by resale or primarily using unbundled elements.

-Cost. Services should be established in ways that are not substantially wasteful in terms of unnecessarily duplicated facilities, unless there are significant offsetting advantages in terms of new competition.

-Subsidies. Support levels should be as low as possible, consistent with other equity and adequacy, in order to avoid the economic losses associated with taxes or surcharges needed to pay the subsidies. This is accomplished by creating competition "for the market."

-Equity and Adequacy. Support levels should adequate in total in order to pay the excess costs of universal service for each carrier supplying service. They should also be distributed appropriately among service areas. Otherwise, there may be inefficiently little entry in areas where the subsidies are set too low and inefficiently much entry where they are set too high.

-Simplicity. The mechanism should be simple, minimizing the costs of auction administration, sophisticated bidding analyses, and expensive cost studies.

-Synergies. If there are substantial cost complementarities ("synergies") across areas, the auction should avoid assignments that fail to exploit those complementarities.

-Flexible dynamics. The design should recognize the certainty that conditions will continue to change. New technologies will be introduced, input prices and service definitions will change, and new firms will gain competencies and gradually alter and expand their business plans. The mechanism must allow all these changes to be accommodated by changes in the marketplace.

Self-correction. The mechanism should be capable of quickly correcting its own mistakes, especially just after the initial subsidy levels are fixed.

II. ENVIRONMENTS FOR THE AUCTIONS

In terms of pure auction design, three other characteristics of the environment are quite important in assessing the alternatives. The first of these is the extent of cost synergies across areas. "Cost synergies," also called "cost complementarities," are the extent to which costs are reduced when certain adjacent geographic areas are served by the same carrier rather than by separate carriers. When there are powerful cost complementarities - meaning that costs of service are much lower when the service areas are clustered appropriately, there can be strong advantages to creating an auction design in which the bidders can account for these complementarities in their bidding and bring about outcomes that respect these cost synergies.

A second important characteristic of the auction environment is the extent of what is called the "common value," which is the source of what is called "the winner's curse." In the PCS auctions, for example, uncertainty about the extent and growth rate of the likely market, the resistance of communities to the installation of thousands of new cell sites, as well as uncertainties about the technologies themselves meant that some bidders were likely to be much more optimistic than others, with the winners potentially being the most optimistic rather than the most efficient bidding firms. Auction design can be set up to reduce the importance of this effect to make it more likely that real values will determine the auction outcome.

A third characteristic is economies of density. When competing carriers are serving the same area, there may be a loss of value due to duplicated costs. The size of this effect may influence how much weight the auction gives to competitive entry and how auction payments are arranged.

We have reached some preliminary conclusions about these characteristics, as follows. The first builds on the observation that the high cost areas, being primarily areas of low density, will not likely determine the location of a switch. Wireline carriers will serve high cost areas from existing switches or switches whose locations are determined by other considerations, and wireless and HFC carriers will likely do the same. Given this, we have attempted to measure cost complementarities.

[Our measure, calculated using the BCM2 model (which applies only to wireline networks) consists of an index that is the percentage increase in cost from extending a network to serve two adjacent CBGs separately rather than extending the network to serve both together. Mathematically, the index for areas A and B with core area X is

$$I(A,B,X) = \frac{C(X\&A)+C(X\&B)-C(X\&A\&B)-C(X)}{C(X\&A\&B)} .$$

We took the areas A and B to be various adjacent geographic census block groups in areas of various population densities, from rural to urban, and we systematically varied the size of the core area X within a relevant range.]

Our preliminary findings (as reported to the FCC) indicate that the relevant cost synergies in wireline networks are small enough (index values

Regarding common value elements, it appears that these, too, are relatively unimportant, at least compared to the situation found in the FCC's spectrum auctions. The market for basic services is well established and there is plenty of experience about the size and composition of demand in this market. The willingness of consumers to switch local exchange carriers will likely be learned in the high population density markets before any marketing attempts are made in the high cost, low population density areas. To the extent that there is uncertainty about technology or about demand for vertical services, a substantial amount of helpful information is likely to come from experience in serving the major population centers before the issues even arise in the high cost of service markets. Many of the other sources of uncertainty do not concern common value elements. For example, to the extent that the bidders use different technologies, they have little to learn from one another about the value of their own technologies during an auction. Neither our discussions nor any other source of which I have knowledge have identified any substantial factor that makes the *common value* uncertainty in these auctions an important consideration.

Finally, our estimates about economies of density (calculated using BCM2) indicate that these can be very substantial: monthly service costs can rise by as much as 50% if there is duplication of the wireline distribution systems within a CBG. The significance of this for the auction design depends on whether entrants would need to build their own distribution networks or would purchase that as an unbundled element from the ILEC.

III. INTERACTING ISSUES

The problem of supplying universal service raises many issues, some of which interact in profound ways with the auction process. Four that deserve special emphasis are discussed here.

The first issue concerns the definition of what is to be auctioned. Most basic is that any auction requires defining clearly what it is that is being auctioned: the service requirements, terms of service, and obligations concerning unbundling and resale need to be fixed. In addition, the bidder responsibilities need to be symmetric. Comparing two bids on the basis of price has little appeal if the two bidders are not bidding for the same thing. Bidders in our proposed auction will be making commitments to supply a package of services specified by a regulator at a specified price to all in the service area who demand it. This commitment should include a commitment to replace the LEC if the LEC loses. If the rules provide that all winning bidders are eligible to receive payments but that only the incumbent LEC has an obligation to serve, then the auction cannot replace inefficient incumbent LECs with new service providers, eviscerating one of the key benefits of the auction approach.

A second related issue concerns the terms and wholesale pricing of unbundled elements of the local exchange service. A key objective of the auction is to replace contentious cost-based regulation with a market process that takes into account all the relevant costs and offsetting

tempted to engage in cherry picking if the service areas are large and customer cost characteristics are heterogeneous. This cherry picking issue also interacts with the issue mentioned in the immediately preceding paragraph. If the unbundled element pricing is determined based on service areas larger than the areas used for universal service auctions, then the LEC would be vulnerable to adverse selection by entrants who use its services only for those areas where the services are underpriced. The ability to operate the auction plan successfully is deeply intertwined with sensible policies toward unbundling and resale.

Fourth, there is an issue of the timing on any new service obligation. A new entrant would typically not be ready to assume obligations immediately, and appropriate rules would be needed governing the transfer of service obligations, especially for those cases in which a new carrier replaces the ILEC as the sole universal service provider.

The preceding is just a sampling of the related issues that can affect bids in the auction. There are others. For example, the support level might be indexed in a fashion similar to price caps, with total payments (consumer payments plus subsidies) increasing at a rate of inflation minus a productivity factor. All such issues need to be resolved before the auction is conducted.

Of course, all of these issues would be important even if no auctions were conducted. My intent here is to emphasize that an auction plan cannot be successful without a satisfactory resolution of these fundamental issues.

IV. USF AUCTION PROPOSALS

The proposed mechanism combines auctions, where possible, with cost regulation. It has several main elements.

A. *The initial support level*

After basic service is defined and basic service prices in an area are fixed, an initial support level would be determined based on a cost model of some sort. This would become the *baseline support level.*

The general unreliability of the models and the sharp disputes among the parties about appropriate levels leads us to expect that the initial estimates will both misestimate total costs and misallocate some costs across areas. To mitigate the latter problem (but not the former), it is proposed that the initial estimates be adjustable within the overall total like in the "basket" index used for price cap regulation. Such adjustments should be subject to some limits, such as a maximum adjustment in each CBG or in groups of CBGs, analogous to the subindices used in connection with price caps. These adjustments would be a one-time event, not to be repeated when future changes are made in the support levels.

B. *The notification process*

nominator and no competition from the ILEC, the nominator would become the new universal service carrier, assuming the role of ILEC.

C. *Auction Rules*

Following the nomination of a CBG, a reserve price would be set equal to the current support level plus a fixed amount to allow upward or downward adjustment of the support price. There would follow a sealed bid auction in which all bidders submitting bids within a specified margin of the lowest bid would be declared "winners" of the auction, responsible to provide service to all who demand it and eligible to receive a suitable subsidy.

+   Some modifications of this rule have also been discussed by the team to promote the facilities-based competition objective and to accommodate the possibly significant economies of density factor. One such proposal is to specify a larger margin for a bidder whose plans call for reliance entirely on its own facilities for the local loop, making it more likely that such a bidder would be declared a winner and eligible to receive universal service subsidies.

+   A second proposal, which is discussed in a separate exchange of e-mails and mentioned here only for completeness, is to allow each bidder to specify separate bids for the price it would require as a sole supplier, as one of two suppliers, as one of three, and so on, and to take as the winner the set of bidders that minimize the subsidy cost net of some presumed benefit to the increased levels of competition.

The sealed bid auction has the advantage of simplicity for both the bidders and the administrators, but fails to account for interdependencies among areas and to provide opportunities for learning about common value elements. The case for this auction in this application is that the interdependencies and common value elements are relatively unimportant in this application.

C.1 The margin and the reserve price

The margins we have discussed could be stated in percentage or absolute terms and could vary with the number of bidders, as explained in my first filing with the FCC. According to one view, since the rationale for allowing multiple competitors is that consumers benefit from having multiple suppliers, either on account of competition among them or from the variety of services offered when there are several kinds of suppliers, and since the amount of consumer benefit is likely unrelated to the cost of service, it may be attractive to specify the margin as an absolute number, such as $3 per subscriber per month, rather than as a percentage. Others have mentioned a two-part rule with a fixed amount plus a percentage. The mathematical analysis on which the auction is based gives no clear message about the best way to do this.

The relation between the reserve price and the margin would affect the possible qualitative auction outcomes. For example, in the initial

This amount clearly meets the requirements for "adequacy" since the support amount for each bidder at least meets its own bid. The nondiscriminatory subsidy amounts encourages competition among providers on equal terms "in the market."

One key unresolved issue is the form of subsidy payment. One position is to regard the support payment as an infrastructure subsidy for firms willing to make their services available to all potential subscribers in an area. From this perspective, one can argue that a fixed subsidy should be preferred to a per subscriber subsidy, at least for facilities-based entrants. To the extent that the entrant plans to use some unbundled services of the ILEC, however, a fixed subsidy for infrastructure investment is unwarranted. Also, payment of a fixed subsidy for infrastructure investment could require monitoring the carrier's infrastructure investments and could also reduce the carrier's incentives to make its product offerings attractive to subscribers. Various two-part subsidy arrangements (with fixed and variable components) could be considered, but we have not yet had an serious analysis or discussion of this possibility.

C.3 Bid withdrawals

My initial proposal suggested that allowing bid withdrawals by low bidders could play a useful role in the auction, as a device to allow bidders to account for cost synergies (by withdrawing bids if they are winners on an awkward or too small collection of CBGs). However, my initial proposal was vague about the withdrawal process. Therefore: To allow for the limited synergies, I propose that bid withdrawals by winning bidders be allowed. The lowest bidder in each CBG would be given the first opportunity to withdraw its bid with each higher bidder moving in sequence.

If the result of the bid withdrawals is that only one eligible bid has been made, the auction is canceled. The result is the same as if there were only one bidder, that is, the remaining bidder becomes the sole universal service provider at the pre-existing price.

C.4 Term of obligation and time to next auction.

If the result of the auction is a change in the set of firms serving a CBG, then the new terms are fixed for a period of, say, three years. During this time the CBG would not be eligible to be noticed again for auction. If the result of the auction is no change in the set of firms serving the CBG, then the area would be eligible to be nominated again in the next round of auctions.

This rule encourages competition in the auction by ensuring that the low bidders acquire something of value, including a head start compared to losing bidders in entering an area, which can be particularly significant when entry requires sinking costs. The second part of the rule encourages entry after a long period of no entry and eliminates the possibility strategic creation of sham auctions conducted just to protect the incumbent firms from new entry.

set equal to the second highest bid. If two or more bidders submit bids of zero, then each would acquire an obligation to serve, but no bidder receives a subsidy for undertaking that obligation. The rationale for this rule is that zero is a particularly inexpensive subsidy to administer, but bidders have no incentive ever to bid zero in the unmodified auction proposal.

D. *Adjustments initiated by the ILEC*

If no firm notifies the regulator of its intent to bid on a CBG, the ILEC itself can propose an increase in the support payment, in effect asking to be relieved of its obligation if to supply service at the existing subsidy price. (Some restrictions might be imposed on the number of CBGs where the ILEC makes a proposal of this kind.) When the ILEC proposes an increase, the regulator makes an announcement requesting that another eligible telco assume the ILEC's responsibility at the specified support price. If one or more eligible telcos agrees to do so, then the ILEC forfeits its rights to receive support payments in that CBG and is replaced by the accepting telcos, which become the new ILECs.

If no eligible telco accepts the regulator's proposal, then the support price is increased by a fixed amount proposed by the ILEC, limited by some prespecified rule. The area can then be nominated for an auction. One proposal is to allow it to be auctioned in just the same way as described in subsection C above. One may also construct an alternative auction rule for this case: one proposal calls for a simultaneous multiple round auction of these licenses.

The adjustments initiated by the ILEC provide an opportunity to make quick corrections in case of errors in the initial support levels. However, these may need to be limited because they also allow the ILEC to manipulate support payments in areas where competitive entry is unlikely. There are difficult trade-offs in this part of the design.